416-129

W. I. GIBSON.

PROPELLER.

APPLICATION FILED SEPT. 26, 1913.

1,147,083.

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2 SHEETS—SHEET 1.

Fig. 1.

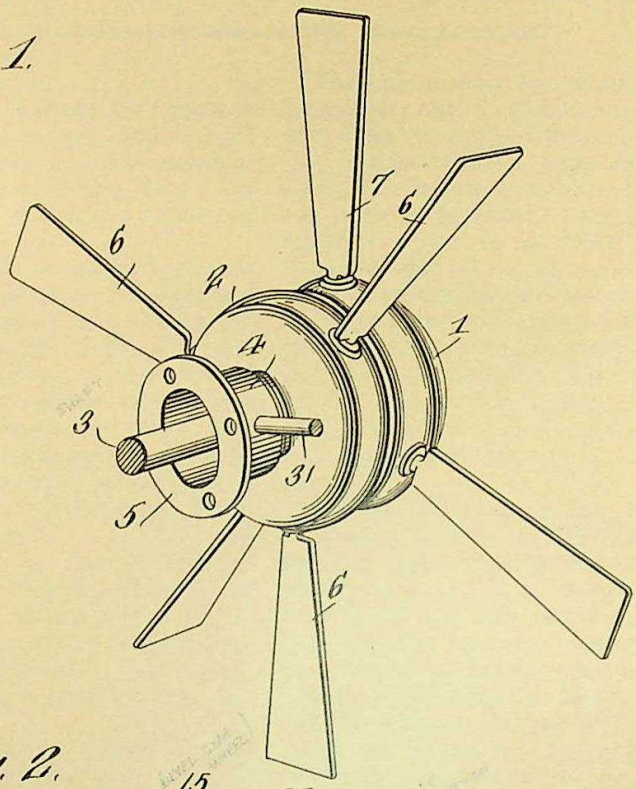
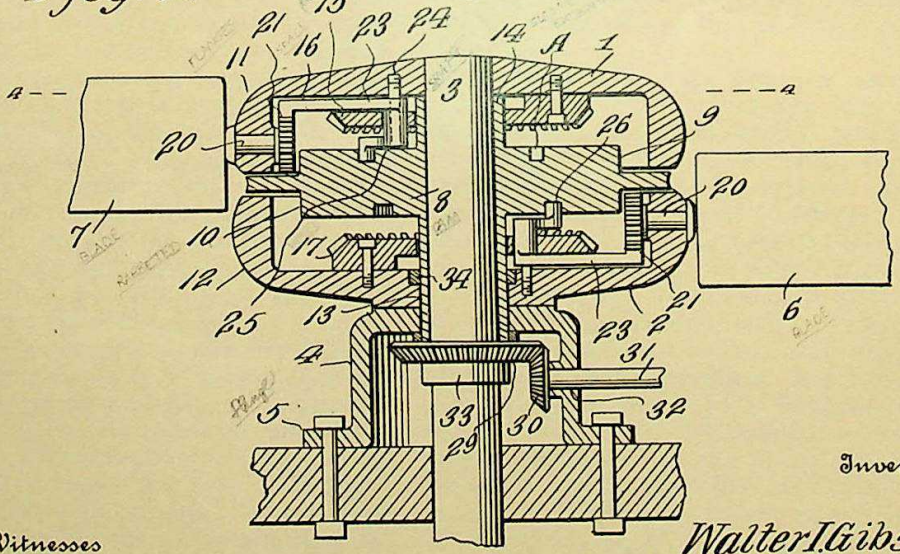


Fig. 2.



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2 SHEETS—SHEET 2

Fig. 3.

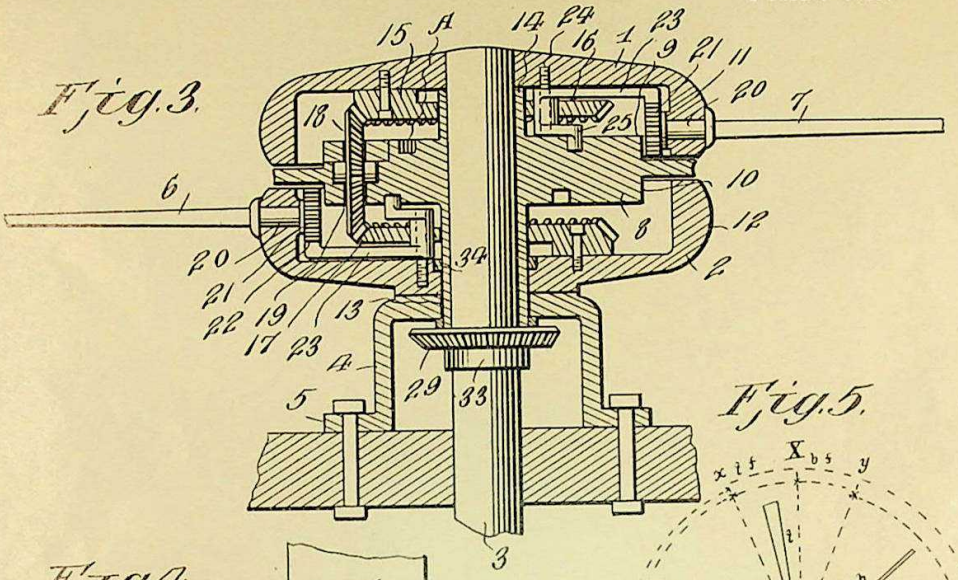


Fig. 5.

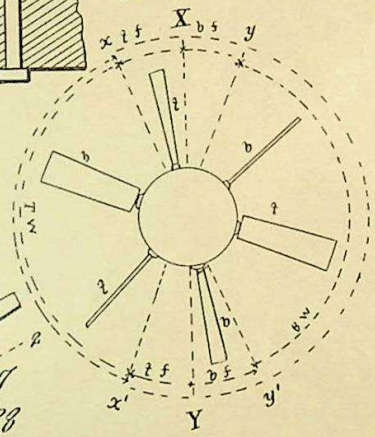
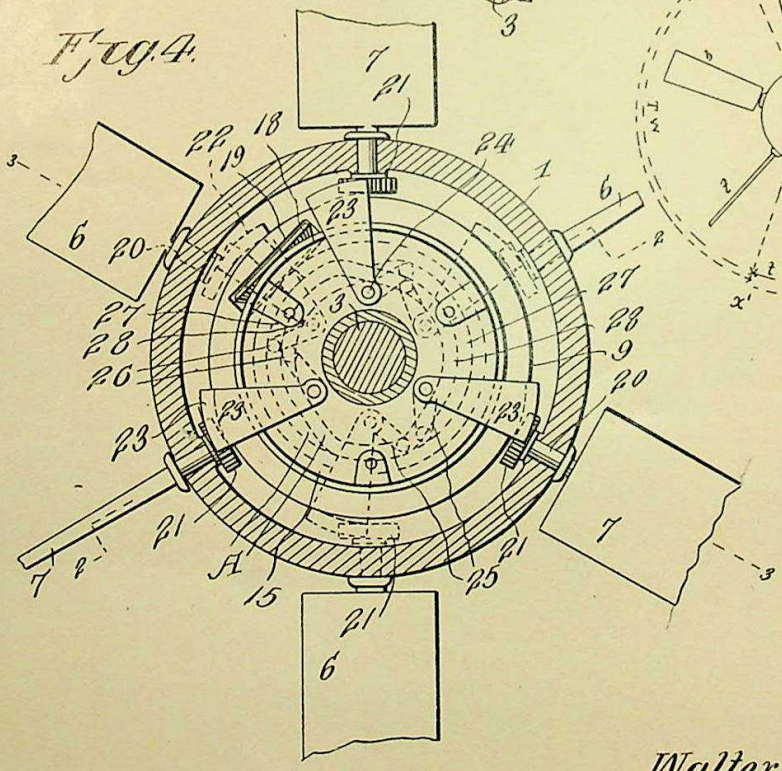


Fig. 4.



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PROPELLER.

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To all whom it may concern:

Be it known that I, WALTER I. GIBSON, a citizen of the United States, residing at Washington, in the District of Columbia, have invented new and useful Improvements in Propellers, of which the following is a specification.

This invention relates to propellers, and especially to paddle propellers the object of the invention being to produce a feathering blade propeller the construction of which enables the propelling force to be applied at various angles with respect to the line of movement of the vessel or craft upon which the propeller is used so that in addition to the propelling function of the device, the latter may be used for directing or steering the course of the vessel.

A further object of the invention is to produce a propeller involving the use of two sets of feathering blades revolving simultaneously in opposite directions whereby equal propelling power is obtained at both sides of the axis of movement of the propeller.

A further object is to provide in connection with such propeller having two sets of oppositely moving blades, means for varying the points at which the blades perform their feathering action and exert their pushing force, the said means controlling the feathering of the blades being under control of the operator without necessitating the stoppage of the propeller.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts, as will hereinafter be more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a perspective view of a propeller embodying the present invention. Fig. 2 is a diametrical section through the same. Fig. 3 is a diametrical section on an enlarged scale through the hub of the propeller. Fig. 4 is an enlarged section taken at right angles to the shaft showing the feathering mechanism. Fig. 5 is a diagram illustrative of the feathering action of the blades.

In carrying out the present invention I employ a hub embodying two sections 1 and 2, the said sections being interiorly chambered to receive and contain the feathering mechanism hereinafter particularly described.

The hub section 1 is mounted fast on the propeller shaft 3 which may be driven by any suitable motive power, said shaft being journaled in a support or bearing 4 formed with an attaching flange 5 adapting it to be fastened to the hull of a vessel whether operated in water or in the air, the propeller of this invention being adapted both to marine and aerial craft.

Two sets of feathering blades 6 and 7 are employed, the blades 6 being attached to the hub section 2 and the blades 7 being carried by the hub section 1, the said hub sections and consequently the blades carried thereby, turning simultaneously in opposite directions.

Mounted to turn on the shaft 3 is a cam 8 in the form of a disk having the outer margin thereof rabbeted on both sides as shown at 9 and 10 to receive the flanges 11 and 12 of the hub sections 1 and 2. This provides for forming a comparatively tight and snug joint between the hub sections and the cam 8 and enables heavy grease or similar lubricant to be packed within the two-part hub so as to efficiently lubricate the working elements of the device and also to exclude water where the propeller is submerged.

At one side the cam disk 8 is provided with a sleeve 13 which extends for a suitable distance along the shaft 3 and forms a bearing or journal upon which the hub section 2 revolves. At its opposite side the cam disk 8 is provided with another sleeve extension 14 which extends through a bevel gear wheel 15 fastened to and rotating with the hub section 1 and offset from the inner face of said hub section 1 to leave a space 16 for the reception of the bell crank levers hereinafter particularly described. A corresponding bevel gear wheel 17 is fastened to the inside of the hub section 2 and spaced therefrom in a manner similar to the bevel gear wheel 15 above referred to and for a like purpose. The two bevel gear wheels 15 and 17 are geared together for simultaneous rotation in opposite directions by means of a bevel pinion 18 which is journaled in a slot 19 in the cam disk 8.

The blades of each series are provided at their inner ends with journals 20 which pass through bearing openings in the flanges 11 and 12 of the hub sections while on the inner end of each journal 20 is a pinion 21 which is in mesh with the teeth 22 of a sector

forming one arm of a bell crank lever 23 fulcrumed on a pin 24 connecting one of the hub sections with the bevel gear wheel carried thereby as shown in the sectional view Fig. 3. The inner arm 25 of each bell crank lever is provided with a pin 26 which works in a cam groove A embodying a portion 27 of larger radius and another portion 28 of smaller radius. The cam disk 8 is provided with two of said cam grooves A one in each of the opposite faces thereof as shown in Fig. 3, the form of the cam groove being best illustrated in Fig. 4. The cam disk 8 which is normally stationary thus acts on the pins 26 of the bell crank levers to swing the latter on their fulcrums and through the medium of the teeth 22 and pinion 21, to turn the blades 6 or 7 as the case may be from their operative positions to their feathered positions, each blade assuming an operative position once in each complete revolution of the propeller. Furthermore, the grooves A in the opposite faces of the cam disk are so arranged as to act upon the blades of one set at a point diametrically opposite to the point at which the other set of blades are acted upon. In this way the blades of one series assume their operative positions at one side of the axis of movement of the propeller while the blades of the other series assume their operative positions at a diametrically opposite point. In this way the power exerted by the propeller as a whole is equal at both sides of the axis of the propeller irrespective of the angles assumed by the blades.

The means for adjusting the cam disk and correspondingly varying the point at which the blades feather, embodies a cam shifting gear wheel 29 fast on the sleeve 13, said wheel being engaged by a bevel pinion 30 on the end of a cam operating shaft 31 which is journaled in an opening 32 in the bracket or bearing 4 above referred to. By turning the shaft 31, any suitable hand device being employed for that purpose, a corresponding movement is imparted to the wheel 29 and therefore to the disk 8. At all other times, however, the disk 8 remains stationary and operates on the bell crank levers in the manner and for the purpose hereinabove stated.

33 and 34 designate collars on the shaft 3 and sleeve 13 respectively for properly positioning and holding the hub section 2 and the bearing 4 and wheel 29 in proper operative relation. By the means described for varying the point at which the blades act broadside against the water or air, the vessel or other craft may be steered as the resistance is to one side or the other of the normal direction of the craft.

The steering action described in other words is as follows; two diametrically opposite blades are presented broadside at the same time owing to the shape of the two cam grooves. When, therefore, the cam is turned on its vertical axis represented by the shaft 3, the position of the cam grooves is correspondingly altered and consequently a new line of thrust is established as the diametrical line in which the opposite blades are brought to a broadside position has been shifted.

From the foregoing description it will now be understood that the two sets of blades 6 and 7 revolve simultaneously in opposite directions and the cam grooves A are so described in the opposite faces of the cam disk that when one of the blades of one series is presented broadside, a blade of the other series is fully feathered or presented edgewise so as to pass by the other blade as clearly shown in Fig. 2. This prevents any possibility of the blades interfering with each other in their feathering action and also enables the two sets of blades to work in close proximity to each other thereby economizing in space and adapting the propeller as a whole to vessels of extremely light draft.

Ordinarily the propeller shaft 3 will extend vertically or substantially so while the propeller blades will sweep in a horizontal plane. By arranging the propeller in this way and placing the same within a tunnel formed in the bottom of a boat, the latter may be driven in very shallow water without danger of injuring the propeller. The propeller is especially designed for shallow draft water craft but may also be used for air craft, being especially desirable on account of the small space taken up thereby.

Fig. 5 illustrates diagrammatically the feathering action of the two sets of propeller blades, of indicating the feathering zone of the top blade and TW the arc through which the top blade moves while in its working position. *bf* designates the bone in which the bottom blade *b* moves from its feathered to its working position or vice versa, and BW, the arc through which the blade *b* swings while in its working position. In other words, the top blade in moving from the point X to *x* turns from its feathered to its working position. From *x* to *x'* the said top blade remains in its working position and it again turns to its feathered position in moving from *x'* to Y. From Y back to X in a counter-clockwise direction the top blade remains feathered or inoperative. The bottom blade in moving in a clockwise direction from X to *y* turns its feathered to its working position and remains in its working position from the point *y* to the point *y'*. At the last named point the said bottom blade begins to turn to its feathered position which movement is completed when it reaches the

point Y. From the point Y in a clockwise direction around to the point X, the bottom blade remains in its feathered condition.

What I claim is:—

1. A propeller comprising two sets of feathering blades revolving in opposite directions, a hub embodying two concentric sections each carrying one set of blades, and means feathering said blades so that while one blade of one series is in active position a blade of the other series passing the same point is feathered, and gearing interposed between said hub sections and associated therewith to cause the same to rotate in opposite directions.

2. A propeller comprising two sets of feathering blades revolving simultaneously in opposite directions, a hub comprising opposite revoluble sections by which the sets of blades are carried, and bevel gears interposed between the hub sections and associated therewith to cause the opposite rotation thereof.

3. A propeller comprising two sets of feathering blades revolving in opposite directions, means for feathering said blades so that while one blade of one series is in active position a blade of the other series passing the same point is feathered, and means for varying the point of feathering movement of said blades.

4. A propeller comprising two sets of feathering blades revolving in opposite directions, means for feathering said blades so that while one blade of one series is in active position a blade of the other series passing the same point is feathered, and an adjustable cam and connections for varying the point at which the blades are feathered.

5. A propeller comprising two sets of feathering blades revolving in opposite directions, means for feathering said blades so that while one blade of one series is in active position a blade of the other series passing the same point is feathered, and an adjustable cam and bell crank lever connections for varying the point at which the blades are feathered.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER I. GIBSON.

Witnesses:
E. E. Edmonston, Jr.,
E. Hume Talbert.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."